



California Occupational Guides

Guide for



Alternative Fuel Vehicle Technicians in California

May also be called: Auto Mechanics; Automotive Repair Technicians; Battery Electric Vehicle Technicians; Electric Vehicle Electricians; Fuel Conversion Technicians; Fuel Retrofitting Technicians

Specialties within this occupation include: Electric Vehicle Technicians; Hybrid Vehicle Technicians

What Would I Do?

Alternative Fuel Vehicle (AFV) Technicians are a critical link in the growing green automotive industry. The role of the AFV Technician is first and foremost an automotive mechanic. They inspect, maintain, and repair automobiles and light utility trucks that operate on standard fuels (gasoline and diesel), as well as vehicles powered by alternative fuels, such as liquefied petroleum gas (LPG), compressed natural gas (CNG), ethanol, or biodiesel. They also work on plug-in electric and hybrid-electric vehicles. Hybrids are powered by a combination of gasoline and electricity. Technicians typically specialize in one or two areas; some Technicians may work in all areas.

Alternative Fuel Vehicle Technicians perform routine maintenance services including oil changes, fuel and air filter changes, tire rotations, and engine tune-ups. Technicians test vehicle components and interpret readouts using computerized diagnostic equipment. They service and repair vehicle systems, such as braking, steering, air conditioning, and heating. Technicians must understand the differences between various fuels and fuel systems. They must also be knowledgeable about fuel properties and the proper storage and handling of the particular type of fuel they work with.

Electric Vehicle Technicians work on vehicles powered solely by electricity. They perform routine maintenance like other mechanics; however, Electric Vehicle Technicians must have extensive knowledge of how lithium-ion or nickel-metal hydride batteries and automotive systems interact. In addition, they may replace hydraulically assisted systems with electric-powered systems, such as power-steering pumps or air-conditioning compressors, to improve operating range.

Hybrid Vehicle Technicians perform many of the same duties as Technicians who work on gasoline or other alternative fuel vehicles. However, the technological makeup of hybrid vehicles is more complex and uses a much higher voltage battery (up to 650 volts compared to 12-14 volts in gasoline-powered vehicles). Therefore, Technicians who work on any type of electric-powered vehicle require electrical expertise. They must also have knowledge and training in servicing regenerative braking and hydraulic systems.

Tools and Technology

Alternative Fuel Vehicle Technicians use a variety of tools in order to perform their work, including circuit testers, code readers, digital volt ohm meters (DVOM), laptop computers, leak testing equipment, pneumatic impact wrenches and vacuum equipment, pressure indicators, scanners, and specialty wrenches. Today's automobiles are highly computerized; therefore, Technicians use a variety

of software, such as analytical or scientific, facilities management, information retrieval, and project management.

Important Tasks and Related Skills

A formal survey to determine specific skills requirements for Alternative Fuel Vehicle Technicians has yet to be completed. Therefore, the sample skills shown below are common for the two occupations closest to Alternative Fuel Vehicle Technicians: Automotive Master Mechanics and Automotive Specialty Technicians. Each task is matched to a sample skill required to carry out the task.

<i>Task</i>	<i>Skill Used in this Task</i>
Examine vehicles, compile estimates of repair costs, and secure customers' approval to perform repairs.	Customer and Personal Service
Diagnose and replace or repair engine management systems or related sensors for flexible fuel vehicles (FFVs) with ignition timing, fuel rate, alcohol concentration, or air-to-fuel ratio malfunctions.	Complex Problem Solving
Troubleshoot fuel, ignition, and emissions control systems, using electronic testing equipment.	Troubleshooting
Retrofit vehicle fuel systems with aftermarket products, such as vapor transfer devices, evaporation control devices, swirlers, lean burn devices, or friction reduction devices, to enhance combustion and fuel efficiency.	Mechanical
Inspect propane or natural gas high-pressure tanks, piping or pressure regulators.	Problem Sensitivity
Test electronic computer components in automobiles to ensure proper operation.	Operation Monitoring
Install or repair air conditioners and service components, such as compressors, condensers, and controls.	Arm-Hand Steadiness
Convert fuel systems from gasoline to butane gas, ethanol, methane, or other alternative or biofuel systems.	Engineering and Technology
Service or repair biodiesel, butane gas, ethanol, methane, or other alternative or biofuel systems or internal combustion engine systems for hybrid electric vehicles.	Repairing
Perform routine vehicle maintenance such as changing spark plugs, fuel filters, air filters, and batteries in hybrid electric vehicles to ensure proper and efficient functioning.	Equipment Maintenance
Conduct visual inspections of compressed natural gas fuel systems to identify cracks, gouges, abrasions, discoloration, broken fibers, loose brackets, damages gaskets, or other problems.	Near Vision

Source: U.S. Department of Labor [Occupational Information Network \(O*NET\)](http://online.onetcenter.org) at online.onetcenter.org

Working Conditions

Alternative Fuel Vehicle Technicians usually work indoors in well-ventilated, well-lit repair shops; however, some shops may be drafty and noisy. Technicians work with dirty, greasy parts and in awkward positions. Minor cuts, burns, and bruises are common, and they may also risk injury from lifting heavy parts and tools, but following proper safety precautions can prevent most accidents.

Those who work on hybrid or electric vehicles are required to have specialized training to safely work on the high-voltage systems of these vehicles. They must also wear personal protective equipment (PPE) and use insulated (rubberized) tools to avoid electrocution. Caution should be used by Technicians who work on natural gas vehicles due to the risk of explosions.

Technicians who work for automobile dealerships typically use specialized tools provided by the dealership or automobile manufacturer, but they may need to provide their own hand tools. Those working for private auto repair shops may be required to provide all their own tools.

Alternative Fuel Vehicle Technicians generally work a 40-hour week; however, evening and weekend work may be required to meet customer needs.

Some Technicians may belong to the International Association of Machinists and Aerospace Workers union. Technicians who work for government agencies may belong to public employee unions.

Will This Job Fit Me?

The job of Alternative Fuel Vehicle Technician may appeal to those who enjoy activities that involve practical, hands-on problems and solutions and who like working with tools and machinery, as well as computers and technology.

What Wages and Benefits Can I Expect?

Wages

A formal salary survey for Alternative Fuel Vehicle Technicians is not available; however, their earnings are typically comparable to Automotive Service Technicians and Mechanics. According to the Occupational Employment Statistics Survey, wages in 2011 for Automotive Service Technicians and Mechanics in California range from \$30,280 to \$53,436 annually, or \$14.56 to \$25.69 hourly. The median wage is \$39,364 annually, or \$18.92 hourly. The median is the point at which half of the workers earn more and half earn less. All salaries depend on the pay structure established by each employer for work performed, the nature of the project, and the skill of the specialists. Generally, workers in large cities earn higher wages than those who work in small towns and rural areas.

Benefits

Alternative Fuel Vehicle Technicians generally receive health insurance as well as vacation, holidays, and retirement plans. Self-employed Technicians are responsible for their own benefits.

What is the Job Outlook?

As this is an emerging occupation, the number of Alternative Fuel Vehicle Technicians in California is unknown at this time. However, employment opportunities are expected to increase in the future considering society's growing interest in environmental protection and the reduction of greenhouse gas emissions. In the coming years, there will most likely be a need for additional Technicians to service and repair the growing number of alternative fuel vehicles.

How Do I Qualify?

Education, Training, and Other Requirements

Most employers prefer Alternative Fuel Vehicle Technicians who have a high school diploma or the equivalent and education and training in general auto mechanics, plus specialized training in

alternative fuel vehicle technology. Training can be obtained through community colleges, trade schools, and vehicle manufacturers. Many community colleges offer degree or certificate programs focused on alternative fuel vehicle maintenance. In addition, some community colleges partner with vehicle manufacturers to offer specialized programs.

Experience

The amount of experience required to be an AFV Technician varies by employer. Some firms may require a combination of education and experience, while others require Technicians to reach the master mechanic level before being able to work on alternative fuel vehicles. Some employers may require that Technicians possess one or more certifications from the National Institute for Automotive Service Excellence (ASE).

Early Career Planning

High school students interested in Alternative Fuel Vehicle Technician careers should take courses in English, mathematics, computer technology, physics, and auto mechanics. Good reading, mathematical, and computer skills are essential in order to interpret technical manuals.

Training programs may also be available through Regional Occupational Programs (ROP). To find an ROP program near you, go to the California Association of Regional Occupational Centers and Programs Web site at www.carocp.org/carocps.html.

Apprenticeship Programs

While there are no apprenticeship programs specifically for Alternative Fuel Vehicle Technicians, some Technicians learn basic automotive technology through formal apprenticeship programs offered by local unions or some California community colleges. Most programs require four years of on-the-job training plus related classroom instruction. Apprenticeship program applicants must be at least 18 years of age (or 17 years with written parental consent) and physically able to perform the work. Most programs require a high school diploma or the equivalent and the possession of a valid California driver license. For more information on apprenticeship programs currently available, visit the State of California's Department of Industrial Relations, Division of Apprenticeship Standards at www.dir.ca.gov/das.

Continuing Education

Continuing education is currently not a requirement for Alternative Fuel Vehicle Technicians. However, new and improved technology will create a need for continuous training to learn new techniques and skills. Employers or vehicle manufacturers may provide training.

Certification

There are currently no certification requirements for Alternative Fuel Vehicle Technicians in California; however, various associations offer voluntary certification. For example, ASE offers Alternate Fuels Technician (Light Vehicle Compressed Natural Gas Technician) certification, CSA Standards offers CNG Fuel System Inspector certification, and the Electronics Technicians Association (ETA) offers Electric Vehicle Technician (EVT) certification.

Because many alternative fuel vehicles on the road are under warranty, many vehicle manufacturers require that maintenance and repairs be done by Technicians who have been certified by the vehicle manufacturer.

For more information, go to the U.S. Department of Labor's Career InfoNet Web site at www.acinet.org and scroll down to "Career Tools." Click on "Certification Finder" at www.acinet.org/certifications_new/default.aspx and follow the instructions to locate certification programs.

Where Can I Find Training?

There are two ways to search for training information at www.labormarketinfo.edd.ca.gov/?Pageid=1013:

- [Search by Field of Study](#) to find what programs are available and what schools offer those programs. You may use keywords such as: Alternative, Automobile, Automotive, and Vehicle.
- [Search by Training Provider](#) to find schools by name, type of school, or location.

Contact the schools you are interested in to learn about the classes available, tuition and fees, and any prerequisite course work.

Where Would I Work?

According to the California Green Economy Survey, most Alternative Fuel Vehicle Technicians work in auto dealership service departments or private repair shops. Others work in wholesale trade, educational services, and transportation and warehousing. Technicians may also work for governmental agencies.

Finding a Job

Direct application to employers remains one of the most effective job search methods. Newspaper classified ads, Internet job listings, job fairs, or college career centers may also provide job leads.

Online job opening systems include JobCentral at www.jobcentral.com and CalJOBSSM at www.caljobs.ca.gov.

To find your nearest One-Stop Career Center, go to Service Locator at www.servicelocator.org. View the helpful job search tips at www.labormarketinfo.edd.ca.gov/occguides/JobSearchTips.pdf for more resources. (requires [Adobe Reader](#)).

Yellow Page Headings

You can focus your local job search by checking employers listed online or in your local telephone directory. Below are some suggested headings where you might find employers of Alternative Fuel Vehicle Technicians.

- Alternate Fuel
- Alternative Fuel
- CNG Cars
- CNG Engines
- Electric Motors
- Electric Vehicles
- Government Offices
- Hybrid
- LP Gas Engines
- LPG Engines

Find Possible Employers

To locate a list of employers in your area, use “Find Employers” on the LaborMarketInfo Web site at www.labormarketinfo.edd.ca.gov/aspdotnet/databrowsing/empMain.aspx?menuChoice=emp

- Select the search for employers by occupation.
- Select a geographic area.
- Search for an occupation by keyword, occupation, or category.
- Select one of the top industries that employ the occupation.
- This will give you a list of employers in that industry in your area.
- Click on “View Filter Selections” to limit your list to specific cities or employer size.
- Click on an employer for the street address, telephone number, size of business, Web site, etc.
- Contact the employer for possible employment.

Where Could This Job Lead?

Alternative Fuel Vehicle Technicians may advance to positions such as senior Technicians, fleet service managers, shop owners, or teachers.

Related Occupations

Below is a list of occupations related to Alternative Fuel Vehicle.

- Aircraft Mechanics and Service Technicians (SOC 49-3011)
- Automotive Master Mechanics (SOC 49-3023.01)
- Engine and Other Machine Assemblers (SOC 51-2031)
- Farm Equipment Mechanics (SOC 49-3041)
- Fuel Cell Technicians (SOC 17-3029.10)
- Helpers, Installation, Maintenance, and Repair (SOC 49-9098)
- Industrial Machinery Mechanics (SOC 49-9041)

Other Sources

- California Department of Industrial Relations, Division of Apprenticeship Standards
www.dir.ca.gov/das
- U.S. Department of Energy, Alternative Fuels and Advanced Vehicles Data Center
www.afdc.energy.gov/afdc/vehicles/technician_training.html
- CSA Standards
www.csa-america.org
- Electronics Technicians Association International (ETA International)
www.eta-i.org
- FourEnergy
www.fourenergy.org
- International Association of Machinists & Aerospace Workers
www.iamdistrict190.org
- National Alternative Fuels Training Consortium
www.naftc.wvu.edu
- National Automotive Technicians Education Foundation (NATEF)
www.natef.org
- National Institute for Automotive Service Excellence (ASE)
www.ase.com

These links are provided for your convenience and do not constitute an endorsement by EDD.

For the Career Professional

The following codes are provided to assist counselors, job placement workers, or other career professionals.

System	Code
SOC – Standard Occupational Classification at www.bls.gov/soc	N/A
O*NET – Occupational Information Network at www.onetonline.org	N/A
CIP – Classification of Instructional Programs at http://nces.ed.gov/ipeds/cipcode/crosswalk.aspx?y=55	
Alternative Fuel Vehicle Technology/Technician	470614
TOP – Taxonomy of Programs at www.cccco.edu/Portals/4/AA/Inventory_of_Approved_Programs_Rev2010.doc	

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